MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

15 MARCH 2019
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **ALL** questions.

Question 1 [10 marks]

Solve the followings:

a. $\sqrt[3]{1-2x}-3=0$ (2 marks)

b. $(2x+5)^2-(2x+5)=6$ (4 marks)

c. $(x+1)(x-2)^2(x+3)>0$ (4 marks)

Question 2 [10 marks]

a. Sketch the graph of $y=|x|$. Using the idea of transformation sketch the graph of $y=|x+2|-3$ on the same xy axis. Identify the x- intercepts and y-intercepts. (4 marks)

b. Given the piecewise function:

$$f(x)=\begin{cases} x^2+1 & , \quad x\le 1 \\ 4 & , \quad 1<x<3 \\ -2x+9 & , \quad 3<x\le 6 \end{cases}$$

i. Find the value of $f(1)+2f(4)$. (2 marks)

ii. Sketch the graph of $f(x)$. (4 marks)

Question 3 [10 marks]

a. Solve the following equations:

i. $5^{x-2}=3^{3x+2}$ (3 marks)

ii. $\log_3(x+1)+\log_3(2x-3)=\log_9 9$ (3 marks)

b. Show that the inverse function of $f(x)=2e^{x+1}-4$ is $f^{-1}(x)=\ln\left(\frac{x+4}{2}\right)-1$.

Hence find $f(0)+f^{-1}(0)$. (4 marks)

Continued...

Question 4 [10 marks]

a. Use the Principle of Mathematical Induction to show that:

$-2-3-4-\cdots-(n+1)=-\frac{1}{2}n(n+3)$. (5 marks)

b. In the expansion of $(x-3y)^9$, find:

i. the coefficient of x^4y^5. (2 marks)

ii. the last three terms of the expansion. (3 marks)

Question 5 [10 marks]

a. Given an arithmetic sequence: a, 13, 18, 23, ...Find:

i. the value of a. (1 mark)

ii. $S_{20}-10a_{15}$. (3 marks)

b. Given a geometric sequence such that $a_3 = 48$ and $a_5 = 768$.

i. Find the values of first term, a_1, and common ratio, r. (4 marks)

ii. Find the sum of the first 7 terms if the common ratio is a negative value. (2 marks)

End of Paper

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$S_n = \frac{n}{2}(a_1 + a_n)$

$a_n = a_1 r^{n-1}$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$